Holmes & Narver | Raytheon

CALCULATION COVER SHEET

Date: 06/16/02

Calculation No: 3442.083.SCAL.001
Calculation Title: LDCC TOWER STRUCTURAL MODIFICATIONS
Project No. & Title: 100256 LDCC COOLING TOWER IMPROVEMENTS

ORIGINAL AND REVISED CALCULATION/ANALYSIS APPROVAL

	Rev. A Name/Signature/Date	Rev. O Name/Signature/Date	Rev. _____ Name/Signature/Date
Originator:	DAVID APPLE 6-20-02	David A Apple 8-29-02	
Checked By:	BOB PLATT 6-20-02	8.29.02	
Approved By:	BOB PLATT 6-20-02	8.29.02	
Other:			

AFFECTED DOCUMENTS

Document Number	Document Title	Rev. Number
Dwg. # C 53117	LDCC COOLING TOWER IMPROVEMENTS	O

RECORD OF REVISION

Rev.	*Reason for Revision*
A	FIRST ISSUE
Rev. O	All pages of this calculation, 3442.083.SCAL.001, Rev. A are considered Rev. 0, approved and released based upon no technical changes to the calculation during/after formal review.

TOTAL CALCULATION PAGE COUNT 153

1-63
63A
64-152

Holmes & Narver | Raytheon

CALCULATION CHECKLIST

Project No. TASK ORDER 83
100256 LDCC COOLING TOWER IMPROVEMENTS

Calculation Number: 3442.083.SCAL.001 | Revision A

Reviewer/Checker (print name): BOB PLATT

Date: 6.20.02

Reviewer performed or supervised subject calculation.
__X__ NO _____ YES Justification Attachment _____, _____ pages

Alternate Verification method approved _____ Method _____

ITEM(S) CHECKED	Accept Y/N	OBJECTIVE EVIDENCE Sheets		INITIAL/ DATE
1. Cover forms properly completed.	Y			KRP 6.20.02
2. Calculation Sheet headers complete with calc. no., rev., etc.	Y			KRP 6.20.02
3. Calculation Sheet contents complete per format.	Y			KRP 6.20.02
4. Listed attachments included.	Y			KRP 6.20.02
5. Calculation Objective clearly described.	Y			KRP 6.20.02
6. Criteria are suitable and properly referenced to task-specific documents.	Y			KRP 6.20.02
7. Assumptions and data described and attached or referenced to task documents.	Y			KRP 6.20.02
8. Calculation method identified and appropriate for the design activity.	Y			KRP 6.20.02
9. Calculation results reasonable and correctly described in Results and Conclusions.	Y			KRP 6.20.02
10. Computer Program identified with version and revision.	Y			KRP 6.20.02
11. Computer Program references method used, etc.	Y			KRP 6.20.02
12. Computer input/output provided.	Y			KRP 6.20.02
13. Computer run traceable to calculation.	Y			KRP 6.20.02
14. Computer input data within permissible design input range.	Y			KRP 6.20.02
15. Computer Program validation/verification addressed.	Y			KRP 6.20.02

REMARKS

Date 6.20.02

Checker Signature

BOB PLATT
Printed Name

Date 6/20/02

Preparer Signature

DAVID APPLE
Printed Name

Holmes & Narver | Raytheon

DESIGN CALCULATION SHEET

Project No. TASK ORDER 83
100256
Page: 3

Calculation No.: 3442.083.SCAL.001
Rev. A

Performed By: DAVID APPLE
Date: 6/20/02

Calculation Title: LDCC TOWER STRUCTURAL MODIFICATIONS
Project: 100256 LDCC COOLING TOWER IMPROVEMENTS

Checked By: BOB PLATT
Date: 6/20/02

INTRODUCTION

Purpose	Provide structural modifications to Cooling Tower 1837 that will enable part of the tower to operate continuously without having to shut down the entire tower for annual maintenance. Provide a portable davit crane installed below tower grating to allow for hoisting of debris from cooling tower sump during annual maintenance. Title II structural drawings of the structural modifications will be provided based on the designs included in these calculations
Scope	Provide Title II services for the design of a reinforced concrete sump divider wall, and baffle under tower cell #2 to divert water from cell #2 onto the west side of the divider wall. The previous modifications of the tower sump area will be removed to restore the sump area to the original configuration. The concrete removals will require new structural support of the existing fiberglass grating in the sump area. A hoist system will be designed to lift a 30 gallon steel drum from the cooling tower sump floor to the top of the tower grating. A steel hatch will be installed in the steel tower grating to accommodate the hoist and drum removal system.

DESIGN BASIS

Design Inputs	Design a sump divider wall and baffle system to allow for the either the east or west side of the tower to be separated and remain dry while the opposite side remains operational, to allow annual maintenance operations to be conducted without a complete shut down of the tower Provide the design of a structural lift system designed to lift a 30 gallon drum from the sump area.
Criteria	The sump divider wall and baffle should allow for either side of the tower to remain operational while the opposite side is available for annual maintenance procedures, which require the sump area to be free of water. The operators for the equalizer valves should be located so as to be protected from overhead water flows, and be operable from the sump grating. The hoist system should be removable from its mounting and installed within a hatch to be inserted to the steel tower grating, to allow for the least impact to the existing conditions in this area. Material strengths: Concrete: f'c = 4000 psi for design Reinforcing bars: ASTM Grade 60. Structural Steel: A36 36 ksi for angles, bars and plates, A572 50 ksi, for beams, A500 Grade B 46 ksi for structural tubing.
Assumptions	The sediment and debris to be removed from the sump area will be wet, with a density < 100 lbs/ft^3. The hoist system shall have the capacity to lift a 30 gallon steel drum filled with the sediment material to be removed from the sump during annual maintenance operations. The concrete divider wall will be treated with waterproofing materials to allow for a completely watertight wall. Structural steel and components will be galvanized to resist corrosion. Stainless steel anchors and fasteners will be used to resist corrosion. Aluminum will be used for the baffle, matching the existing baffle in the tower sump area.

Holmes & Narver | Raytheon **DESIGN CALCULATION SHEET**	Project No. TASK ORDER 83 100256 Page: 4
Calculation No.: 3442.083.SCAL.001 Rev. A	Performed By: DAVID APPLE Date: 6/20/02
Calculation Title: LDCC TOWER STRUCTURAL MODIFICATIONS Project: 100256 LDCC COOLING TOWER IMPROVEMENTS	Checked By: BOB PLATT Date: 6.20.02

REFERENCES	See Index.
METHODS	The reinforced concrete divider wall will be designed per current codes, and will adopt some criteria from ACI 350 – Environmental Engineering Concrete Structures. The structural steel and components will be designed per current codes.
RESULTS AND CONCLUSIONS	The hoist system designed will meet the required lifting requirements. The reinforced concrete divider wall and baffle system designed will allow for maintenance operations to be conducted on one side of the tower without a complete shutdown of the tower.

Holmes & Narver | Raytheon **DESIGN CALCULATION SHEET**	Project No. TASK ORDER 83 100256 Page: 5 .
Calculation No.3442.083.SCAL.001 Rev. A	Performed By: DAVID APPLE Date: 6-20-02
Calculation Title: LDCC TOWER STRUCTURAL MODIFICATIONS Project: 100256 LDCC COOLING TOWER IMPROVEMENTS	Checked By: BOB PLATT Date: 6.20.02

INDEX